We claim:

1. A fuel cell gas diffusion layer comprising a hydrophilic surface layer having a thickness of no more than 1 micron, and, thereunder, a hydrophobic second layer comprising a fluoropolymer having a thickness of at least 5 microns.

2. The fuel cell gas diffusion layer according to claim 1 wherein said hydrophobic second layer comprises dispersed particles of carbon and a fluoropolymer.

3. The fuel cell gas diffusion layer according to claim 1 wherein said hydrophobic second layer comprises a carbon fiber construction coated with a fluoropolymer.

4. The fuel cell gas diffusion layer according to claim 1 additionally comprising a supporting third layer underlying said second layer.

5. The fuel cell gas diffusion layer according to claim 4 wherein said supporting third layer comprises a carbon fiber construction coated with a fluoropolymer.

6. The fuel cell gas diffusion layer according to claim 2 additionally comprising a supporting third layer underlying said second layer.

7. The fuel cell gas diffusion layer according to claim 6 wherein said supporting third layer comprises a carbon fiber construction coated with a fluoropolymer.

8. The fuel cell gas diffusion layer according to claim 1 wherein said hydrophilic surface layer comprises functional groups containing Si or a metal.

9. The fuel cell gas diffusion layer according to claim 1 wherein said hydrophilic surface layer comprises functional groups containing Si.

10. The fuel cell gas diffusion layer according to claim 1 wherein said hydrophilic surface layer comprises functional groups containing Si and O.

11. A roll good comprising the fuel cell gas diffusion layer according to claim 1.

12. The fuel cell gas diffusion layer according to claim 1 wherein said hydrophilic surface layer is present on less than all of said hydrophobic second layer, according to a pattern.

13. A method of making a fuel cell gas diffusion layer comprising the steps:

a) providing a carbon fiber construction having an upper surface;

b) coating at least said upper surface of said carbon fiber construction with composition which comprises a fluoropolymer;

c) exposing said upper surface to at least one plasma so as to generate a hydrophilic surface layer having a thickness of no more than 1 micron.

14. The method according to claim 13 wherein said step c) comprises steps d) and e):

d) exposing said upper surface to a first plasma; and

e) exposing said upper surface to a second plasma.

15. The method according to claim 13 wherein said plasma is of species including at least one selected from the group consisting of: oxygen, nitrogen, nitrogen dioxide, nitrous oxide, ammonia and sulfur dioxide.

16. The method according to claim 15 wherein said plasma is additionally of species including at least one selected from the group consisting of: silanes, siloxanes and organometallics.

17. The method according to claim 14 wherein said first plasma is of species including at least one selected from the group consisting of: silanes, siloxanes and

organometallics, and wherein said second plasma is of species including at least one selected from the group consisting of: oxygen, nitrogen, nitrogen dioxide, nitrous oxide, ammonia and sulfur dioxide.

18. The method according to claim 14 wherein said first plasma is additionally of species including at least one selected from the group consisting of: oxygen, nitrogen, nitrogen dioxide, nitrous oxide, ammonia and sulfur dioxide.

19. The method according to claim 14 wherein said first plasma is of species including a silane and oxygen and wherein said second plasma is of species including oxygen.

20. The method according to claim 19 where said silane is tetramethylsilane.

21. The method according to claim 13, additionally comprising the step of:

f) partially covering said upper surface with a mask having windows according to a pattern such that said hydrophilic surface layer having a thickness of no more than 1 micron is applied according to said pattern.

22. The method according to claim 13 wherein said carbon fiber construction is provided as a roll good and said step of exposing said upper surface to at least one plasma is performed in continuous roll-to-roll fashion.

23. The method according to claim 13 wherein said step c) of exposing said upper surface to at least one plasma is carried out at sub-atmospheric pressures.

24. The method according to claim 13 wherein said step c) comprises exposing said upper surface to a plasma of silane (SiH_4), oxygen, and essentially no other species.

25. The method according to claim 24, additionally comprising the step of:

f) partially covering said upper surface with a mask having windows according to a pattern such that said hydrophilic surface layer having a thickness of no more than 1 micron is applied according to said pattern.

26. The method according to claim 24 wherein said carbon fiber construction is provided as a roll good and said step of exposing said upper surface to at least one plasma is performed in continuous roll-to-roll fashion.

27. The method according to claim 24 wherein said step c) of exposing said upper surface to at least one plasma is carried out at sub-atmospheric pressures.

28. The method according to claim 13 additionally comprising the step of:

g) exposing said upper surface to at least one priming plasma of species including at least one selected from the group consisting of: oxygen, nitrogen, nitrogen dioxide, nitrous oxide, ammonia and sulfur dioxide prior to step c).

29. The method according to claim 13 additionally comprising the step of:

g) exposing said upper surface to at least one priming plasma of species including at least one selected from the group consisting of: oxygen, nitrogen, nitrogen dioxide, nitrous oxide, ammonia and sulfur dioxide prior to step d).

30. A fuel cell electrode comprising the fuel cell gas diffusion layer according to claim 1 and a layer of fuel cell electrode catalyst in contact with said hydrophilic surface layer.